

## **An Analysis of Exports and Growth in Pakistan**

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### **I. INTRODUCTION**

Trade is presumed to act as a catalyst of economic growth and the growth in exports leads to increase in the incomes of factors of production, which in turn increases the demand for input for further expansion in production. The resultant pressure on domestic capacity may stimulate technological change and investment opportunities. Also increase in demand due to raising incomes of the factors of production on account of exports may spill over into other sectors of the economy. A part of such growths could also be diffused abroad through technical assistance and aid. According to Emery (1967) empirically proved that higher rates of exports growth leads to higher economic growth. Traditionally, a developing country had the choice of two alternative trade strategies for supporting industrial development, export promotion or import substitution. A consensus has emerged among many development economists that an export expansion policy by permitting resource exploitation according to comparative advantage and by allowing for utilisation and exploitation of economies of scale leads to higher growth rates of output and employment, greater technological progress and availability of foreign exchange. These in turn enable the countries with export oriented policies to attain higher rates of growth of GNP *vis-à-vis* countries following import substituting industrialisation [Donges and Muller-Ohlsen (1978)].

Export performance is an imperative gadget of job creation, improvement of balance of payment position, accelerated economic growth and increase the income level and living standard of the masses. In this regard Pakistan is trying best to increase its exports. During the early years 1948-49, 99 percent of Pakistan's export earnings were made up of just five primary commodities; raw jute, raw cotton, raw wool, hides and tea. A change began to occur early in the pattern of exports as Pakistan's economic policies shifted towards an emphasis on industrialisation. During 1951-52, five main commodities contributed to the tune of 93 percent of export earnings and by 1958-59 that had fallen to 75 percent.

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A key feature of the high growth rate in the 1960s' was the trade regime adopted by the government i.e., export bonus or bonus voucher scheme. The export bonus scheme undoubtedly had a positive effect on export in the early 1960s the scheme compensated for the overvalued exchange rate and increased exports particularly manufactured goods [Zaidi (2000)].

Table 1 presented Pakistan's exports over the last thirty-four years period increased (in constant rupees) at a rate of 7.7 percent per annum. In the first half during the 1970s, however, the worldwide inflation and diversion of inter-wing to international trade resulted into rather high growth rate of 27.1 percent. During the second half of 1970s Pakistan's export growth were 10.6 percent. In the first half of 1980s Pakistan's exports hardly registered any growth, rising rate only at 1.7 percent per annum. During the second half of the 1980s export growth rate rises to 11.6 percent per annum. During the first half of nineties exports were growing at an average rate of 6.4 percent per annum. This performance was due to better cotton crop during 1992-93 and 1994-95. After that during the late 1990s the performance of exports was adversely affected to an average growth rate of 3.0 percent per annum and that was due to imposition of the sanctions. During 2000-01 to 2003-04, the export growth raised at the rate of 5.4 percent per annum.

Table 1

*Growth Rate (Constant Prices 1980-81 =100)*

Period/Year	Export Growth	GDP Growth
1970-71 to 1974-75	27.1	5.03
1975-76 to 1979-80	10.6	5.78
1980-81 to 1984-85	1.7	6.27
1985-86 to 1989-90	11.6	5.38
1990-91 to 1994-95	6.4	4.21
1995-96 to 1999-00	3.0	3.36
2000-01 to 2003-04	5.4	5.09
1970-71 to 2003-04	7.7	5.61

Source: *Economic Survey of Pakistan* (Various Issues). Growth rates are simple growth rates.

In Table 1, it also implies that from 1970-71 to 1984-85, export growth rate decreases from 27.1 percent to 1.7 percent while GDP growth rate increases from 5.03 percent to 6.27 percent. During the year 1990-91 to 1999-00 export growth decreases from 6.4 percent to 3.0 percent, and the GDP growth rate also decreases from 4.21 percent to 3.36 percent. However, 1995-96 to 2003-04 export increases from 3.0 percent to 5.4 percent, while GDP growth increases from 3.36 percent to 5.09 percent, respectively.

Table 2 shows how drastically the composition of exports has changed. From 1970-71, the nature of Pakistan's trade in terms of value addition has changed considerably. Primary commodities which were 99 percent of exports in 1948-49, fell to 33 percent in 1970-71, and were only 16 percent in 1995-96. Contrary to the primary commodities, manufactured goods now contribute as much as 78 percent in 2003-2004.

Table 2

*Economic Classification of Exports (%)*

Year	Primary Commodities	Semi Manufactures	Manufactured Goods
1970-71	33	24	43
1975-76	44	18	38
1980-81	44	11	45
1985-86	35	16	49
1990-91	19	24	57
1995-96	16	22	62
2000-01	13	15	72
2003-04	10	12	78

Source: *Economic Survey of Pakistan* (Various Issues).

The relationships between exports and GDP growth have been examined in the literature. According to MacKinnon (1964) and Chenery and Strout (1966) the foreign exchange earned from exports allows imports of capital and other intermediate goods which increase production potential. Balassa (1978) and Krueger (1990) identified exports increase total factor productivity because of their impact on economies of scale and other externalities such as fostering technology transfer, improving skills of workers, improving managerial skills and increasing productive capacity of the economy. The other advantage of export-led growth is that it allows for a better utilisation of resources, which reflects the true opportunity cost of limited resources and does not discriminate against the domestic market.

For developing countries, there are a number of studies analysing the role of exports towards the economic growth and most of these studies concluded that there is a positive relationship between exports and economic growth, such as, Balassa (1978, 1985), Jung and Marshall (1985, 1987), Chow (1987), Shan and Sun (1988), Bahmani-Oskoei, Mohtadi and Shabsigh (1991), and Khalifa Al-Youssif (1997). This literature credited the effects of exports on economic growth where as exports promote threshold effects due to economies of scale, increased utilisation capacity and productivity gains. In 2005 Gunter, Taylor and Yeldan conclude that any gains from trade liberalisation are often associated with external effect that are dynamic in nature. Baldwin and Forslid (1996) and Feenstra (1990), provided a useful framework for analysing the relationship between exports and economic growth.

To testify the causality between exports and growth started during the early 1980s. Lancaster (1980) pointed out that increased growth might cause increased exports which occurred as a result of increasing output and foster might improve export sector performance. Schentzer (1982) in the study did not deal with nonstationarity. The co-integration analysis and error correction modeling are remedies for spurious regressions that occur with nonstationary variables. Causality tests are invalid in the presence of co-integration as developed by Granger (1988) and Bahmani-Oskooee and Alse (1993). Engle and Granger (1987) showed that causality must run in at least one direction if two variables are cointegrated.

## II. METHODOLOGY

Export-oriented policies are assumed to provide guidance for resource allocation considering comparative advantage, allow for capacity utilisation, permit the exploitation of economies of scale and generate technological improvement in response to trade environment prevalent at local as well as global level. They also result in increase in employment pattern, which affects individual income and income distribution pattern. By this process such policies are expected to lead the economy towards better growth performance. To assess such causation or examine cause and effect relation between exports revenue and economic growth various statistical approaches are proposed to apply. In the present study co-integration and error correction techniques in the spirit of Engle and Granger (1987) and Johansen (1988) using Granger Causality Test were applied. Augmented Dickey-Fuller [ADF (1979)], and Phillip-Perron (PP) (1988) tests were applied to infer the order of integration for the level and first difference of each variable.

Feder (1982) presented a growth model of an economy with export and non-export sectors and the same was also applied to assess the relationship between export's revenue and economic growth.

### Unit Root Test

In time series data realisation is used to draw inference about the underlying stochastic process. So to draw inference from the time series analysis, stationarity test becomes essential. A stationarity test which has been widely popular over the past several years is unit root test. In this study Augmented Dickey Fuller (ADF) test was applied to estimate unit root. ADF here consists of estimating the following regressions:

$$\Delta y_t = \omega y_{t-1} + \sum_{i=2}^m a_i \Delta y_{t-i} + \mu_t \quad \dots \quad \dots \quad \text{(Pure Random Walk Model)}$$

$$\Delta y_t = \beta_0 + \omega y_{t-1} + \sum_{i=2}^m a_i \Delta y_{t-i} + \mu_t \quad \dots \quad \dots \quad \text{(with intercept or drift term)}$$

$$\Delta y_t = \beta_0 + \beta_1 + \omega y_{t-1} + \sum_{i=2}^m a_i \Delta y_{t-i} + \mu_t \dots \text{(Both a drift and linear time trend)}$$

Where

$y_t$  = Relevant time series

$\Delta$  = A first difference operator

$t$  = Linear trend

$\mu$  = Error term

$$\Delta y_{t-1} = (y_{t-1} - y_{t-2}) \text{ \& } \Delta y_{t-2} = (y_{t-2} - y_{t-3})$$

All the above equations were estimated by using OLS method without drift term, with drift term and including both a drift and linear time trend. The null hypothesis for the existence of unit root was:  $H_0 = \omega = 0$

So

$$F = \frac{(RSS_R - RSS_{UR})/m}{RSS_{UR}/(n-k)}$$

$RSS_R$  = Squared Residuals (Restricted)

$RSS_{UR}$  = Squared Residuals (Unrestricted)

$m$  = Number of Restrictions

$n$  = Number of Useable Observations

$k$  = Number of Parameters Estimated in the Unrestricted model

Hence  $n-k$  = Degree of Freedom in the Unrestricted Model

### Phillips-Perron Test

The distribution theory supporting the Dickey Fuller Tests assumes that the errors are statistically independent and have constant variance. Phillips and Perron (1988) developed a generalisation of the Dickey Fuller procedure that allows for fairly mild assumptions concerning the distribution of the errors. Thus the Phillips-Perron Test allows the disturbance to be weakly dependent and heterogeneously distributed. In this case the regression equations are as follows:

$$y_t = a_0^* + a_1^* y_{t-1} + \mu_t$$

$$y_t = \dot{a}_0 + \dot{a}_1 y_{t-1} + \dot{a}_2 (t - n/2) + \mu_t$$

$n$  = Number of Observations

$\mu_t = E(\mu_t) = 0$  -----but there is no requirement that the disturbance term is serially uncorrelated or homogeneous.

The hypothesis in this case  $a^* = 1$  and  $\dot{a} = 1$  and  $a_2 = 0$

### Co-integration Johansen Test

When all the considered variables are non-stationary at their level but stationary in their first differences, this means to proceed further to imply Johansen

Co-integration test. Economically speaking, two variables will be co-integrated if they have a long term, or equilibrium relationship between them. Thus co-integration of two time series suggest that there is a long term equilibrium relationship between them. Generalised Johansen framework of co-integration tests [see Pesaran and Smith (1998)] has been used. The general form of the vector error correction model is as follows:

$$\Delta y_t = a_0 + a_1 t - \Pi z_{t-1} + \sum_{i=1}^{p-1} \dot{\Gamma}_i \Delta z_{t-i} + \psi w_t + \mu_t$$

Where

$$z_t = (y_t', x_t')' \text{---} y_t \text{ is an } m_y \times 1 \text{ vector of endogenous I(1)}$$

var  $x_t$  is an  $m_x \times 1$  vector of exogenous I(1) variables.

$$\Delta x_t = a_0 + \sum_{i=1}^{p-1} \dot{\Gamma}_i \Delta z_{t-i} + \psi w_t + \mu_t \text{---} w_t \text{ is a } q \times 1 \text{ vector of}$$

exogenous/deterministic variables I (0)

In the model, the disturbance vector of  $e_t$  and  $w_t$  satisfy the assumptions:

- (a)  $\mu_t = (e_t' w_t')$  iid  $(0, \Sigma)$   
 $\Sigma$  = a symmetric positive-definite matrix
- (b)  $\mu_t$  = (the disturbance in the combined model) are distributed Independently of  $w_t$  i.e.  $E(u_t | w_t) = 0$   $a_0$  and  $a_1, \dots$  intercept and trend coefficients respectively.

$\Pi$  = long run multiplier matrix i.e.  $\Pi_y$  multiplier matrix of order  $m_y + m$

Where  $m = m_x + m_y$

$\dot{\Gamma}_{1y} \dots \dot{\Gamma}_{p-1,y}$  = coefficient matrices capture the short run dynamic effects and are of order  $m_y \times m$

$\psi_y$  = the  $m_y \times m$  matrix of coefficients on the I (0) exogenous variables.

### Granger Test

To assess causation direction between exports and economic growth, Granger test involves estimation of following pair of regressions:

$$\begin{aligned} \text{GDP} &= \sum_{i=1}^n a_i X_{t-i} + \sum_{j=1}^n \beta_j \text{GDP}_{t-j} + \mu_{1t} \\ X &= \sum_{i=1}^n \lambda_i X_{t-i} + \sum_{j=1}^n \delta_j \text{GDP}_{t-j} + \mu_{2t} \end{aligned}$$

So 
$$F = \frac{(RSS_R - RSS_{UR}) / m}{RSS_{UR} / (n - k)}$$

$RSS_R$  = Squared Residuals (Restricted)

$RSS_{UR}$  = Squared Residuals (Unrestricted)

$m$  = Number of Restrictions

$n$  = Number of Useable Observations

$k$  = Number of Parameters Estimated in the Unrestricted model

Hence  $n - k$  = Degree of Freedom in the Unrestricted Model.

### III. MODEL AND DATA

The annual data from the year 1970-71 to 2003-04 were drawn from the various issues of *Economic Survey of Pakistan*. The export, GDP and Investment were converted into real terms using GDP deflator. In order to test the validity of the export led growth (ELG) theory and its applicability to Pakistan, a set of three hypotheses formulated including:

- (i) whether GDP and Exports are Co-integrated;
- (ii) whether Exports Granger Cause Growth; and
- (iii) whether Exports Granger Cause Investment.

The results of this analysis will enable in accepting or rejecting the validity of ELG model to Pakistan. The advantage of this approach is to envisage the role of export in economic growth and to test for the long-term relationship between export and investment.

- Real GDP
- Real GDP without Export
- Real Exports
- Investment GDP ratio (I/GDP)
- Labour Force.

According to Sheehey (1990), there is a steady flow of research on the relationship between export and economic growth. This flow started with analysis of bivariate correlation between two variables showing a strong positive correlation between them that implies the benefits of the export promotion. It has two fundamental criticism,

- (i) since exports are a component of GDP where as there is strong bias in favour of a correlation between them:
- (ii) such bivariate tests do not take into account the effect of other relevant factors on economic growth. To overcome this problem, various analysts have tested the effect of export on the economic growth by employing following production function (Balassa approach):

$$GDP^* = \alpha_0 + \alpha_1 K^* + \alpha_2 L^* + \alpha_3 EXP^* \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

$GDP^*$  = Real GDP

$K^*$  = Real Capital stock = I / GDP

$L^*$  = Labour force

$EXP^*$  = Real export

\* indicates annual percentage growth rate.

This model is based on hypothesis that marginal productivities are higher in export production due to the scale effects and externalities associated with export production. Given the labour force and capital stock, expansion of the export sector will raise GDP growth.

According to Feder (1982), the positive externality on the non-export sector and the productivity differential in favour of the export sector in a simple neoclassical model which generalised Balassa's original model. Based on Feder's model (1982) the economy is assumed to consist of two sectors including (1) export and (2) non-export. The overall output is composed of products and services produced by the two sectors. Feder's theoretical framework (Feder approach) is presented in the Equation (2):

$$GDP^* = \alpha (I / GDP) + \beta L^* + [\delta / (1+\delta) + F_x] (EXP^* - EXP / GDP) \quad \dots \quad (2)$$

Where;

$L$  = Employment

$I$  = Total Investment

$GDP$  = Gross Domestic Product

$EXP$  = Export

$EXP^* - EXP / GDP$  = Weighted export growth

\*Indicates the annual growth rate;  $[\delta / (1+\delta) + F_x]$  is the sum of the productivity differential and production externalities.

According to Sheehey (1992), the share of export in GDP and the rate of growth of this ratio for export growth as measured by Sheehey approach in Equation (3).

$$GDP^* = \alpha_0 + \alpha_1 I / GDP + \alpha_2 L^* + \alpha_3 EXP^* \quad \dots \quad \dots \quad \dots \quad (3)$$

where

Star = represent the annual growth rate

$GDP$  = Gross Domestic Product

$I / GDP$  = ratio of gross domestic investment to GDP

$L$  = Labour force

$EXP$  = Export variable, measured in turn by the share of exports in GDP and the rate of growth of this ratio.

The study will first examine the relationship between exports and GDP growth through using bi-variable correlation in order to see a close link between the two variables if it is there. The study will next employ Equations (1) to (3), which



are frequently used to test the export promotion hypothesis, and to examine the effects of exports on economic growth in Pakistan.

The Granger-causality test is employed to verify the key finding from our growth models. These tests are conducted in the following Equations (4 and 5):

$$ECGR_t = a + \sum_{i=1}^m \alpha_i ECGR_{t-1} + \sum_{i=1}^p \beta_i EEXP_{t-1} + \mu_t \quad \dots \quad \dots \quad (4)$$

$$EEXP_t = b + \sum^0 EXP + \sum^p \lambda ECGR_{t-1} + \mu_t \quad \dots \quad \dots \quad \dots \quad (5)$$

Where *ECGR* indicates economic growth measured alternatively by growth rate of GDP (*GRGDP*) and growth rate of GDP net of exports (*NTGDP*) and *EEXP* indicates export orientation, measured in term of export growth (*EXPGR*), export share (*EXPSH*) and growth rate of export share (*EXPGRSH*) and the weighted growth rate of export share (*WTGREXPSH*) are employed to address the concern about the built in correlation between export and economic growth.

To determine the direction of the causal relationship between export and economic growth, we take the sum of the signs on the coefficients attached to the independent variables of two estimated equations. If  $\sum \beta_i > 0$  or  $< 0$  than it is concluded that export growth cause economic growth either to increase or decrease. If  $\sum \lambda_i > 0$  or  $< 0$  then we conclude that the economic growth cause export growth increase or decrease.

The time series data include the possibility obtaining spurious regressions results. To see this problem vividly, the Dickey-Fuller test is applied by using regressions analysis in the following forms [Gujrati (1995), *Basic Econometrics*].

$$\begin{aligned} \Delta GDP_t &= \delta GDP_{t-1} + \mu_t \\ \Delta GDP_t &= \beta_1 + \delta GDP_{t-1} + \mu_t \\ \Delta GDP_t &= \beta_1 + \beta_{2t} + \delta GDP_{t-1} + \mu_t \end{aligned}$$

*t* is the time or trend variable; in each case the null hypothesis is that  $\delta = 0$ , i.e., there is a unit root. The test shows that *GRGDP*, *EXPSH* *WTGREXPSH*, Labour force (*L*) and the ratio of investment to GDP (*I/GDP*), which represent proxy for capital stock and *K* denotes non-stationary.

#### IV. EMPIRICAL RESULTS

##### Result from Bivariate Correlation Tests

Table 3 shows the results of correlation between Export and Gross Domestic Product (GDP). The second and third columns report correlation coefficients for period 1970-71 to 1979-80 and 1980-81 to 2003-04, respectively. The last column presents the correlation coefficient results for the full sample (1970-71 to 2003-04).

Table 3

*Correlation Results for Exports and GDP*

Variables	1970-71 to 1979-80	1980-81 to 2003-04	1970-71 to 2003-04
GDP and EXP	0.983**	0.975**	0.989**
GRGDP GREXP	0.042	0.160	0.078
EXP and NTGDP	0.849**	0.965**	0.984**
GDP and EXPSHR	0.786**	0.590*	0.789**
GRGDP and WTGREXP	0.123	0.220	0.179

\*\*Imply 1 percent level of significance, and \*imply 5 percent level of significance. GDP for Gross Domestic Product, EXP stands for export, GRGDP for growth rate of GDP, GREXP for growth rate of export, NTGDP for GDP net of export, EXPSHR for export share and WTGREXP for the weighted growth rate of exports.

In first correlation, GDP correlated with export (EXP) level. The correlation coefficient between the GDP and EXP are very high and statistically significant at 1 percent level throughout the study periods. In second correlation results the correlation coefficient between the growth rate of GDP (GRGDP) and the growth rate of export (GREXP) are very low and statistically non significant. In third the correlation coefficients between EXP and NTGDP are also very high and statistically significant at 1 percent level. In fourth the correlation coefficients between GDP and EXPSHR are highly significant at both 5 percent and 1 percent significance levels. In the last correlation coefficients between GRGDP and WTGREXP are very low across the entire period of study as well as statistically insignificant. In short, despite the strong bias in favour of correlation between export and growth, the mixed results in Table 3 do not provide firm proof of relationship between them in Pakistan.

### Unit Roots and Co-integration

We tested for unit roots to find the stationarity properties of the data. Augmented Dickey-Fuller (ADF) *t*-tests and Phillips and Perron (PP) tests were used on each variable. The lag length for the ADF tests was selected to ensure that the residuals were white noise. Table 4 shows that the null hypothesis of unit root is accepted for all the variables, which means that the time series in levels were non-stationary. However, the null hypothesis of the unit root is rejected for the first differenced variables, implying all the variables are with first differenced stationary or integrated of order one, I (1) and have no deterministic trend.

Table 4

*Unit Root Tests (1970-71 To 2003-04)*

Variables	Level ADF tests Statistic	Level PP Tests Statistic	First Difference ADF Test Statistics	First Difference PP Test Statistics
GDP	-0.12780	-1.401307	-5.7798**	-6.2011**
Export	0.77176	0.934235	-6.03758*	-6.468034*
Net GDP	1.57883	0.4341	-5.3203**	-6.9037**
Investment	0.94852	0.307172	-6.1792**	-6.24316**
Labour	-1.29540	0.45213	-9.024690**	-19.83049**

Notes: ADF = Augmented Dickey-Fuller; PP = Phillips-Perron.

\*Significant at 5 percent critical value. \*\*Significant at 1 percent critical value.

The Johansen co-integration test for log GDP and log Export, we tested whether there is a co-integrating relationship between export and GDP. The results are presented in Table 5. Table 5 shows we cannot reject the null hypothesis of no co-integration at 5 percent significance level.

Table 5

*Johansen Co-integration Test for Ln GDP and Ln Export*

Hypothesised	Eigenvalue	Trace Statistic	5% Critical Value	Prob
None	0.527467	37.77105	42.9153	0.119
At most 1	0.349945	13.78235	25.8721	0.847

Trace Tests implies 2 Co-integrating eqn(s) at 0.05 percent Level.

\*Implies rejection of the hypothesis at 0.05 percent level.

\*\* MacKinnon-Haug-Michelis (1999) *p*-value.

**The Balassa Approach**

Co-integration means that despite being individually non-stationarity, a linear combination among two or more time series can be stationary. The Co-integrating Regression Durbin-Watson (*CRDW*) test is used and we concluded that *GRGDP*, *I/GDP*, *GRL* and *GREXP* are co-integrated. Although they individually exhibit random walks. We estimated Equation (1) by OLS. The results are given below:

$$GRGDP = -9.873 + 0.713 I/GDP + 0.17 GRL + 0.0016 GREXP \quad \dots \quad (6)$$

(-2.029) (3.003) (0.6) (0.044)

$R^2 = 0.235$  the figures in brackets are *t*-values.

The results in Equation (6) illustrate that the impact of export on economic growth is insignificant. It is clear that exports have been very limited impact on growth. *I/GDP* had very strong impact on growth of *GDP* in Pakistan.

### Feder Approach

According to the ADF test all variables are non-stationary. In CRDW the D-W, d values were above the critical values, indicate that the above variables are co-integrated, there seems to be a stable long-run relationship between the two variables. This type of relationship can be represented with an Error Correction Mechanism (ECM). To build ECM, Equation (2) is rewritten as follows (7):

$$GRGDP = \alpha_0 + \alpha_1 (I / GDP) + \beta_0 GRLAB + \beta_1 WTGREXP + \mu_t \quad \dots \quad (7)$$

Equation (7) in first difference form

$$\begin{aligned} \Delta GRGDP &= \alpha_1 \Delta (I / GDP) + \beta_0 \Delta GRLAB + \beta_1 \Delta WTGREXP + (\mu_t - \mu_{t-1}). \\ &= \alpha_1 \Delta (I / GDP) + \beta_0 \Delta GRLAB + \beta_1 \Delta WTGREXP + \lambda \mu_{t-1} + \varepsilon \end{aligned} \quad (8)$$

$\mu = \lambda \mu_{t-1} + \varepsilon_t$ ; has zero mean and finite variance;  $\lambda$  is the error correction coefficient.

ECM (8) can be augmented to include lags of the differenced variables and level terms to estimate both short run effects of the independent variables on the dependent variable. The order of the lagged value for  $\Delta GRGDP$ ,

$\Delta WTGREXP$ ,  $\Delta (I / GDP)$  and  $\Delta GRLAB$  is 1. After substituting for  $\mu_{t-1}$

Finally (8) becomes

$$\begin{aligned} \Delta GRGDP &= \alpha_0 + \alpha_1 \Delta GRGDP_{t-1} + \alpha_2 \Delta (I / GDP)_t + \alpha_3 \Delta (I / GDP)_{t-1} \\ &\quad + \alpha_4 \Delta GRLAB_t + \alpha_5 \Delta GRLAB_{t-1} + \alpha_6 \Delta WTGREXP_t + \alpha_7 \Delta WTGREXP_{t-1} \\ &\quad + \beta_1 GRGDP_{t-1} + \beta_2 (I / GDP)_t + \beta_3 (I / GDP)_{t-1} + \beta_4 GRLAB_{t-1} \\ &\quad + \beta_5 WTGREXP_{t-1} + \varepsilon \quad \dots \quad \dots \quad (9) \end{aligned}$$

We use the OLS estimator to estimate Equation (9), and the OLS results are

$$\begin{aligned} \Delta GRGDP_t &= 5.2010 + 0.104 \Delta GRGDP_{t-1} + 0.122 \Delta (I / GDP)_t + 0.008 \Delta \\ &\quad (2.114)^* \quad (0.104) \quad (2.047)^* \quad (1.371) \\ &\quad (I / GDP)_{t-1} + 1.009 \Delta GRLAB_t + 0.581 + \Delta GRLAB_{t-1} + 1.216 \\ &\quad (2.574)^* \quad (0.471) \quad (1.117) \\ \Delta WTGREXP_t &+ 0.631 \Delta WTGREXP_{t-1} - 0.871 GRGDP_{t-1} + 0.114 \\ &\quad (3.781)^{**} \quad (0.004) \quad (1.007) \\ (I / GDP)_t &+ 1.001 (I / GDP)_{t-1} + 0.884 GRLAB_{t-1} - 0.021 WTGREXP_{t-1} \\ &\quad (0.841) \quad (0.672) \quad (-0.873) \\ (R^2 &= 0.561, \text{ and } t\text{-values are in brackets}). \end{aligned}$$

It reveals from the error correction model (9) that all the variables affect the GDP growth except weighted export growth in year  $t-1$ . The relative contribution of weighted growth in export share as well as investment ratio was significant at 5 percent and 1 percent, respectively. It infers that there is long-run relationship between export and growth.

### Granger Causality

The purpose of this test whether export Granger causes GDP and to test also the Granger causality between export and investment for the period 1970-71 to 2003-04. The Granger causality test is based on the following regressions:

$$GDP_t = \sum \alpha_i X_{t-i} + \sum \beta GDP_{t-1} + \mu_{1t}$$

$$EXP_t = \sum \alpha_i X_{t-i} + \sum \beta GDP_{t-1} + \mu_{1t}$$

It is assumed that the disturbances  $\mu_{1t}$  and  $\mu_{2t}$  are uncorrelated. The first null hypothesis is that export does not Granger cause GDP. The second null hypothesis is that net GDP does not Granger cause export. The third null hypothesis is that export does not Granger cause investment.

It reveals from the Table 6 that we cannot reject the null hypothesis that exports Granger causes GDP, nor that export Granger cause Net GDP, also exports do not Granger cause investment, thus the results does not provide any support for the causality relationship between export and GDP and Net GDP, implying that the findings does not support the ELG theory for the period 1970-71 to 2003-04. Since we used annual data series only one lag is employed.

Table 6

#### *Granger Causality Tests Results*

Null Hypothesis	Observations	F-Statistic
<b>Granger Causality between Export and GDP (1970-71 to 2003-04)</b>		
GDP does not Granger Cause EXP	33	1.00316
EXP does not Granger Cause GDP	33	5.70851
<b>Granger Causality between Export and Net GDP (1970-71 to 2003-04)</b>		
Net GDP does not Granger Cause EXP	33	5.7051
EXP does not Granger Cause Net GDP	33	2.25914
<b>Granger Causality between Export and Investment (1970-71 to 2003-04)</b>		
GDP does not Granger Cause INV	33	3.061
INV does not Granger Cause GDP	33	2.6325

### V. CONCLUDING REMARKS

The purpose of this study was to test the applicability of the export led growth (ELG) hypothesis for Pakistan during the period from 1970-71 to 2003-04. The paper examined if export and GDP are cointegrated by the using Johanson approach; whether export Granger cause GDP growth; whether export Granger cause investment. A positive Granger Causal relationship running from export to economic growth is suggested by the test results for the long-run period.

The study analysis rejected the hypothesis exports and GDP are not cointegrated and that export granger cause GDP growth. A positive Granger Consol relationship running from export to economic growth is proposed by the test results for the long run. The causality export economic growth shows a quite plausible result. For obtaining a stable macro economic environment and growth on sustainable ground, the export led growth causality can be featured to a great extent with view of government policies towards export promotion. The sustainability of such a policy would be contingent to increase its share of export in the world market. The estimates reveal that growth rate of exports, labour force and investment have significant bearing towards GDP growth in Pakistan. As the ELG model is found to be valid therefore, we should pay full attention to boost up our export.

### REFERENCES

- Bahmani-Oskoei, M., and J. Alse (1993) Export Growth and Economic Growth: An Application of Co-integration and Error-Correction Modeling. *Journal of Development Areas* 27, 535–542.
- Balassa, Bela (1978) Exports and Economic Growth—Further Evidence. *Journal of Development Economics* 5:2, 181–9.
- Chow, P. C. Y. (1987) Causality between Export Growth and Industrial Development: Empirical Evidence from the NICs. *Journal of Development Economics* 19, 277–283.
- Donges, J. B., and L. Muller-Ohlsen (1978) Außenwirtschafts-Strategien und Industrialisierung in Entwicklungs- und Schwellenländern. J. C. B. Mohr.
- Emery, R. (1967) The Relation of Export and Economic Growth. *Kyklos* 20:4.
- Engle, R. F., and C. W. J. Granger (1987) Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica* 55, 251–276.
- Feder, Gershon (1982) On Exports and Economic Growth. *Journal of Development Economics* 12:1, 59–73.
- Feenstra, R. (1990) Trend and Uneven Growth. (NBER Working Paper No. 3276.)
- Granger, C. W. J. (1988) Some Recent Development in a Concept of Causality. *Journal of Econometrics* 39, 199–211.
- Gujarati, Damodar N. (1995) *Basic Econometrics*, (3rd ed). New York: McGraw-Hill.
- Gunter, B. G., L. Taylor, and E. Yeldan (2005) Analysing Macro Poverty Linkages of External Liberalisation: Gaps, Achievements, and Alternatives. *Development Policy Review* 23, 285–298.
- Jung, W. S., and P. J. Marshall (1985) Export, Growth and Causality in Developing Countries. *Journal of Development Economics* 18, 241–250.

- Khalifa, Al-Yousaffi Y. (1997) Export and Growth: Some Empirical Evidence from the Arab Gulf States. *Applied Economics* 29, 693–697.
- Krueger, Anne, O. (1990) Asian Trade and Growth Lessons. *American Economic Review Papers and Proceedings* 80:2, May.
- MacKinnon, J. G., A. A. Haug, and L. Michelis (1999) Numerical Distribution Functions of Likelihood Ratio Tests for Co-integration. *Journal of Applied Economics* 14, 563–577.
- Pakistan, Government of (Various Issues) *Economic Survey of Pakistan*. Islamabad: Finance Division, Economic Advisor's Wing.
- Sheehey, Edmund J. (1990) Exports and Growth: A Flaw Framework. *Journal of Development Studies* 27:1.
- Sheehey, Edmund J. (1992) Exports and Growth: Additional Evidence. *Journal of Development Studies* 28:4.
- Zaidi, S. A. (2000) *Issues in Pakistan's Economy*. Karachi: Oxford University Press, Printed in Pakistan at New Sketch Graphics.

## Comments

This paper is an attempt to show that economic growth is export led and not the other way round. Authors have tried to prove their point by naming some very useful techniques which are widely used these days. The conclusion is well expected that Pakistan should promote export by exploiting all available resources. Using this opportunity I wish to make following comments on this paper.

- (1) It seems to me that authors are very confident of having ELG in Pakistan and therefore, they failed to mention the controversy in the first part of their paper that whether ELG or Growth driven export. There could be three possible hypotheses which need to be tested which are ELG, Growth driven export and feedback mechanism. It has been established fact that there is strong association between export and economic growth but whether this association can be translated into causal relationship or not is not clear.
- (2) Authors are examining ELG hypotheses using time series data for Pakistan but the literature they have referred mainly deals with static cross-country comparisons. For example they have mentioned mainly Balassa approach and Feder approach. Both these approaches are not suitable for time series analysis. In all these studies it has been assumed that export growth is causally prior to economic growth. An equally plausible hypothesis is that output growth causes export growth.
- (3) On technical grounds there are very serious problems in this paper. Authors have named many techniques but they have not applied them in their proper context.
  - (i) In unit root testing authors have carried written three equations of ADF test but which of these has been used is not clear at all and results are not reported. Philips Perron test has been mentioned in the abstract but they have not applied it anywhere. What about lag selection while carrying out unit root testing is not clear at all.
  - (ii) In Table 3 of correlations, I fail to understand that what the point they are trying to make from these correlations. All these correlations are very high just because there is time trend so these are spurious and meaningless but the authors have tried to draw some conclusions from these correlations. Had these variables been stationary, they would have behaved like correlations in the second row.



- (iii) Equation (6) is meaningless as authors himself claimed that all variables are nonstationary at level, so  $t$ -stat and  $R$ -square does not make sense in this case. I have serious reservations about OLS assumptions and I think residuals are not iid.
- (iv) Authors have mentioned that variables are cointegrated without reporting results and also without telling that what was their criteria for lag selection and with which technique they have tested cointegration and how many cointegrated factors they have.
- (v) Authors have mentioned that Growth rate of GDP and Growth rate of Exports are non-stationary which are clearly in contradiction to all the earlier studies where these variable are non-stationary at their level but their growth rates are most probably stationary.
- (vi) If all the variables are non-stationary, then it makes no sense of applying Granger causality testing because it is spurious under such circumstances. Moreover, we all know that Granger causality has very serious limitations even if the variables are stationary.

In the concluding paragraphs the authors seem confused and finally they make a very general statement that Pakistan should opt for export-oriented policies, which is obvious even if their analysis is not there.

The data source for the paper has not been mentioned.

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